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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

DOVE, TRACY MAE

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 03/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/932,050

Applicant(s)

ATSUMI ET AL.

Examiner

Tracy Dove

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 December 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,8,9,14-19 and 22-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,8,9,14-19 and 22-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Art Unit: 1745

DETAILED ACTION

This Office Action is in response to the communication filed on 12/17/04. Applicant's arguments have been considered, but are not persuasive. Claims 1, 4, 8, 9, 14-19 and 22-26 are pending and remain rejected. This Office Action is made **FINAL**, as necessitated by amendment.

Specification

The amendment filed 12/17/04 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: on page 7 the compound "Ni₂Si" is not supported by the original disclosure.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 4, 8, 9, 14-19 and 22-26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 1 and 4 recite a chemical formula $\text{Li}_x\text{Fe}_y\text{PO}_4$ wherein $0 < x \leq 2$ and $1 \leq y \leq 2$. The recited subscripts result in an inoperative chemical formula/structure. In the formula, the "PO₄"

Art Unit: 1745

anion has a charge of 3^- , $(\text{PO}_4)^{3-}$, and Fe has a valance of Fe^{2+} or Fe^{3+} (see Hawley's Condensed Chemical Dictionary, page 647). Thus, in the formula $\text{Li}_x\text{Fe}_y\text{PO}_4$, *y cannot be 2* because the positive charge of the compound ($4+$ or $6+$) cannot be balanced with the negative charge of the phosphate anion ($3-$). Furthermore, in the formula $\text{Li}_x\text{Fe}_y\text{PO}_4$ *x cannot be in the range $1 < x \leq 2$* because *x must be $x=0$ or $x=1$* due to the anionic charge of phosphate and the valance of iron (note *y must be equal to one*). Examiner points out page 5 of the present specification that discloses “ Li_xFePO_4 ” and “ LiFePO_4 ” wherein *y=1*.

Claim 22 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The anode conductive agent “ Ni_2Si ” is not described in the specification as filed.

To the extent the claims are understood in view of the 35 U.S.C. 112, 1st, rejections above, note the following prior art rejections.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4, 8, 9, 14-19 and 23-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Inamasu, JP 10-312789.

Art Unit: 1745

Inamasu teaches a nonaqueous electrolyte secondary battery comprising an active material phosphoric acid compound of the formula Li_xFePO_4 (x depends of the valence of Fe) for the positive or negative electrode active material (0007,0011). Note iron has two possible valence states, 2+ or 3+, and phosphate has a 3- charge. Therefore, $0 \leq x \leq 1$. The Li_xFePO_4 active material has an average grain size of 0.1-100 μm (0020). Examiner points out that Li_xFePO_4 is a preferred compound disclosed by the present specification on page 5. It is important to use a small active material to improve cycle characteristics of the battery (0007). When the phosphoric acid compound is used as the positive active material, the negative active material may be a carbon material such as graphite, lithium or a lithium alloy. Graphite intercalates (dopes) lithium (0018). Lithium metal, lithium alloy and carbon material are all typical materials used for the negative electrode active material of the nonaqueous secondary battery (0002-0004). The electrode materials may be sintered (0023). The nonaqueous electrolyte may include an electrolyte solution comprising an organic solvent (e.g., propylene carbonate) and an electrolyte salt (e.g., LiClO_4) (0012).

The electrodes may include conductive agents, binders or fillers (0013). The electrodes are configured into a film-like structure (molded body) (0009). The negative electrode may include silicon or germanium ($t=0$ and $u=0$) (0018).

Thus the claims are anticipated.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

Art Unit: 1745

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4, 8, 9, 14-19 and 22-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamauchi et al., US 5,705,296 in view of Moriguchi et al., US 6,576,369 and further in view of Goodenough et al., US 5,910,382.

Kamauchi teaches a lithium secondary battery comprising a positive electrode, a negative electrode and an electrolyte wherein the positive electrode is composed of a lithium-cobalt phosphate positive active material. The lithium-cobalt phosphate is preferably LiCoPO_4 (col. 4, lines 16-19) and the active material may comprise only LiCoPO_4 (col. 4, lines 32-34). Transition metals besides cobalt such as Ni, Fe, Mn, Cr and V may be contained in the lithium-phosphate positive active material (col. 4, lines 42-44). The negative electrode may be a carbon material doped with lithium ion (col. 6, lines 15-23). The electrolyte comprises an electrolytic salt and a nonaqueous solvent (col. 7, lines 45-60). The positive electrode may comprise at least the lithium-transition metal phosphate active material, an electrical conducting agent and a binder (col. 4, lines 61-65). The mixture is blended and formed into a positive electrode having a desirable shape and size by a known method such as compression molding (col. 5, lines 18-22). The carbon active material of the negative electrode is mixed with a binder and formed into a carbon negative electrode of a desirable shape and size by compression molding (col. 7, lines 40-44). The positive active material has an average particle size of 0.01-20 μm (col. 2, lines 47-66). The carbon material of the negative electrode may be graphite (col. 7, lines 38-39). The electrolyte solution includes a solvent and a salt. The salt may be LiClO_4 and the solvent may be propylene carbonate (col. 7, lines 45-60).

Art Unit: 1745

Kamauchi does not explicitly teach the carbon negative electrode comprises a sintered carbon material.

However, Moriguchi teaches a lithium secondary battery having an anode comprising a graphite (carbon) material. A conventional method is used to produce the negative electrode of Moriguchi. As employed in prior art lithium secondary batteries, a graphite powder is applied to a metal base serving as a current collector with the aid of a suitable binder and is shaped thereon. Alternatively, a sintered electrode may be produced from the graphite powder without use of a binder. Thus, the negative electrode may be comprised predominantly or solely of the graphite powder (col. 15, lines 31-39).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Moriguchi teaches it is conventional to produce a sintered graphite material anode without use of a binder. One of skill would have been motivated to use a the conventional sintered graphite anode of Moriguchi as the anode for the lithium battery of Kamauchi because the prior art teaches such anodes are well known for use in lithium batteries. Moriguchi teaches both carbon electrodes formed with a binder, taught by Kamauchi, and sintered electrodes (without binder) are conventional methods for forming carbon negative electrodes for lithium batteries.

Kamauchi does not have a specific example wherein the positive electrode active material is a lithium iron phosphate ($\text{Li}_x\text{Fe}_y\text{PO}_4$).

However, Goodenough teaches cathode materials for secondary lithium batteries having the formula LiMPO_4 wherein M is at least one first row transition-metal cation. M is preferably

Art Unit: 1745

Mn, Fe, Co, Ti or Ni or a combination thereof. Preferred cathode materials include LiFePO_4 and LiCoPO_4 (col. 2, lines 12-34).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have been motivated to use the LiFePO_4 positive active material of Goodenough for the LiCoPO_4 (or lithium-transition metal phosphate) positive active material of Kamauchi because Goodenough teaches both positive active materials are known for use in lithium secondary batteries. Furthermore, Kamauchi clearly at least suggests the LiFePO_4 positive active material compound. Kamauchi teaches transition metals besides cobalt such as Ni, Fe, Mn, Cr and V may be contained in the lithium-phosphate positive active material (col. 4, lines 42-44).

Response to Arguments

Applicant's arguments filed 12/17/04 have been fully considered but they are not persuasive.

35 U.S.C. 112, 1st

Claims 1, 4, 8, 9, 14-19 and 22-26 are rejected under 35 U.S.C. 112, 1st, as being non-enabled and for containing new matter.

35 U.S.C. 112, 2nd

All 35 U.S.C. 112, 2nd, rejections have been withdrawn.

35 U.S.C. 102(b)

Applicant argues Inamasu fails to teach the combination of an anode composed of sintered carbon material. Applicant argues paragraph [0023], referred to by the Examiner to

Art Unit: 1745

teach the claim limitation, is describing application techniques for the conductive agent not the anode carbon material of Inamasu.

Examiner points out claims 4, 9, 19 and 22-26 do not contain any limitations regarding an anode comprising a sintered carbon material. Therefore, this argument is not relevant to these claims.

Furthermore, Examiner disagrees with Applicant's analysis of the Inamasu reference. Specifically, Inamasu teaches the "the negative-electrode active material used for this invention has the desirable fine particles" [0020] and that the "fine particles" may be sintered [0023]. Thus, Inamasu teaches the negative active material fine particles (carbon) may be sintered.

Note claim 1 recites "an anode wherein said anode comprises sintered carbon material". This limitation does not require the sintered carbon material be the active material of the anode, only that the sintered carbon material be contained in the anode. \

Therefore, Applicant's arguments are not convincing.

35 U.S.C. 103(a)

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant states "the use of LiFePO_4 as the positive electrode active material is contrary to the teachings of Kamauchi". Examiner requests that Applicant point out the section of Kamauchi that recites LiFePO_4 is not desired or preferred. The mere absence of a specific compound from the teaching of a reference does not equate to "teaches against".

Art Unit: 1745

Applicant's argument that "none of the cited references contain all of the elements of the Applicant's independent claims 1 and 4" is not relevant to the 35 U.S.C. 103(a) rejection. If any of the cited references contained all of the claimed elements, an anticipation rejection would have been made. All elements are taught by the combination of references (Kamauchi, Moriguchi and Goodenough).

Applicant argues Kamauchi does not teach or suggest a non-aqueous secondary cell wherein the positive electrode is comprised of lithium iron phosphate. Examiner disagrees with applicant because Kamauchi at least suggests a positive electrode active material containing lithium iron phosphate in column 4, lines 42-44. Kamauchi does not require any specific molar ratio of cobalt:phosphorus:lithium as asserted by Applicant. This is only an embodiment of Kamauchi and the reference is not limited to any particular embodiment. Kamauchi teaches transition metals besides (instead of) cobalt such as iron may be contained in the lithium phosphate active material. Thus, it is unclear how Applicant reached the conclusion that Kamauchi teaches away from a lithium iron phosphate positive active material. While Kamauchi does not teach a specific example of a lithium iron phosphate compound, Kamauchi at least suggests a lithium iron phosphate compound. Furthermore, Goodenough is cited in combination with Kamauchi to teach the lithium iron phosphate limitation of the instant claims.

Regarding Moriguchi, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Art Unit: 1745

Moriguchi is not cited for teaching the cathode material. This limitation is taught by Goodenough and Kamauchi.

The instant claims are directed toward a known anode and a known cathode. Simply combining a known anode and a known cathode for a non-aqueous secondary battery is considered obvious. Contrary to Applicant's assertion, there is a reasonable expectation of success in combining a known anode and a known cathode for a non-aqueous secondary battery.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

Art Unit: 1745

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Tracy Dove', is positioned above the printed name and title.

Tracy Dove
Patent Examiner
Technology Center 1700
Art Unit 1745

February 25, 2005